



The Role of CMS in the Research, Education and Outreach for Climate Change

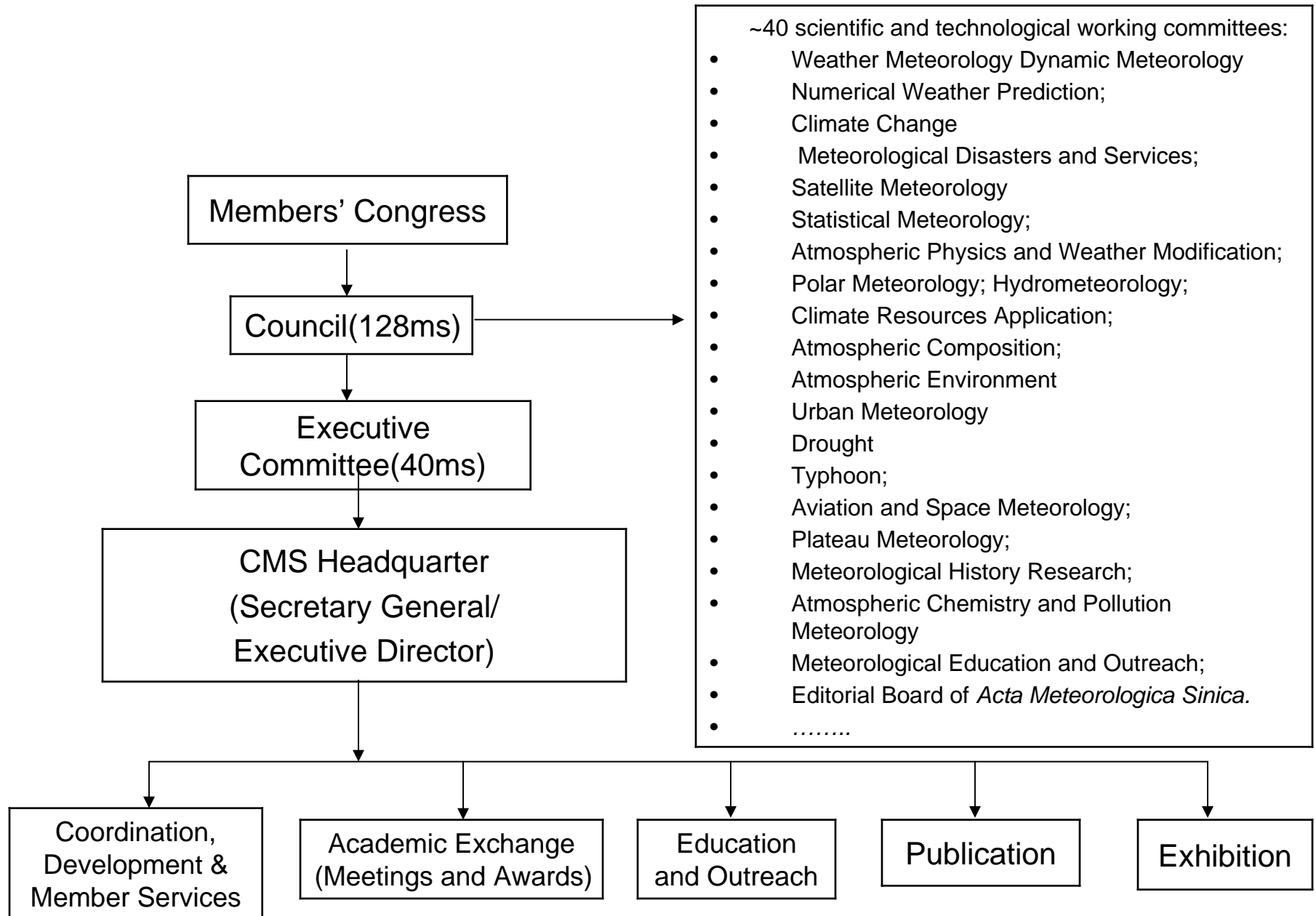
QIN Dahe
Chinese Meteorological Society

IFMS Global Meeting One, Atlanta, Georgia, USA
19-20 Jan 2010

Introduction of CMS

- Founded on 10 Oct 1924 with 31 individual and 6 corporation/institutional members
- Now 22,500 individual and 133 corporation/institutional members
- To encourage meteorologist, there are two Awards:
 - The TU C.W. Young Meteorologist Award
 - The ZOU J.M. Award
- Publications:
 - Acta Meteorologica Sinica* (Chinese Edition)
 - Acta Meteorologica Sinica* (English Edition)
 - 24 Journals by CMS provincial/working Committees
- About 20 conferences annually organized by CMS

Structure of Organization, CMS



About the CMS

- CMS is a family of all meteorologists in China.
- CMS recruits members beyond CMA, and coordinates activities among universities, institutes and CMA.
- CMS organizes academic exchanges and outreach programs.
- CMS is also a part of CAST (China Association for Science and Technology)

About the CMS

- The Chinese government leaves mainly the responsibility of climate change to the meteorologists, so CMS feels the heaviness on their shoulder.
- The research, education and outreach of climate change are our important job, which need an efficient cooperation between CMA, ministries, university and institution under *the umbrella of CMS*.

Part 1: Research and Publications

Part 2: Education and Outreach

Part 3: Future Plan

Part 1: Research & Publications

Climate Predication

-----an example

- **Climate Overall:**
National Climate Center (NCC)
- **Ecology & Agriculture:**
National Met Center (NMC)
- **Climate Remote Sensing:**
National Satellite Met Center (NSMC)
- **Climate Data Processing:**
National Met Info Center (NMIC)
- **Climate System Monitoring:**
- Met Obs Center (MOC) CMA
- **Climate Change Exclusive:**
CMA Climate Change Center

Regional Met Centers: 8
Provincial Met Bureaus: 31
Municipal Met Bureaus: 14
Sub-Provincial Met Offices: 318
County Met Offices: 2300

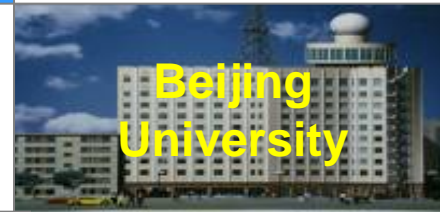
- **Greenhouse Gas Monitoring:**
Centre for Atmosphere Watch & Services (CAWAS), CMA
- **Clean Energy Development:**
Center for Wind and Solar Energy Resources Assessment (CWSERA), CMA
- **Education and Training:**
CMA Training Center
- **Education and Outreach**
China Met News Daily
China Met Press
China Weather TV
CMA Public Weather Service Center
- **Academic Exchange and Community Coordination**
Chinese Meteorological Society

Research Institutes

**Chinese Academy of
Meteorological Sciences,
and 8 institutes**

- They do climate change monitoring, assessment, model development, impacts analysis, public services,
- ...

**IAP, IG,
ICREE, CAS**



**Nanjing Univ.,
Lanzhou Univ.,
Nanjing Univ. of
Sci. & Tech.,...
et al.,**

**Ministry of Hydrology,
Agriculture,
Aviation,**

CMS Coordination:

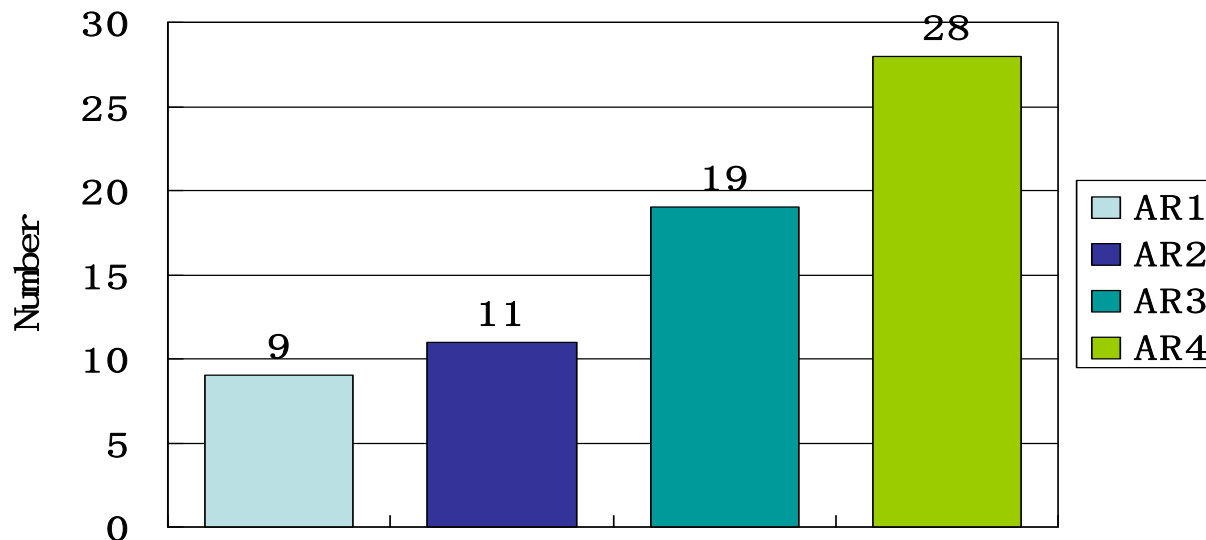
- Academic conference
- Journal publication
- Tie-up with CAST and sister societies for climate change research, education and outreach

Key Areas of Climate Research

- ***Detection, attribution and projection*** of climate change: Global and China /regional
- **Aerosol** and its climate effects in China
- Climate **model** development and multi-model evaluation
- Climate change **impact** on water, food security, human health and
- Strategy in **adaptation and mitigation** to climate change.
-

China's participation in IPCC

- Organize and coordinate the [recommendation and nomination](#) of authors for IPCC assessment reports.
- Organize China's [participation in IPCC related international meetings](#), exchange and disseminate the scientific progress made by Chinese scientists in climate change and adaptation research.
- The number of [Chinese authors](#) for the IPCC assessment reports has increased significantly (see chart below).



A Science Salon on future directions of climate change research

**No. 6 CAST New
Ideas Academic
Salon**

14-16 May 2007

Beijing

CAST & CMS



The Journal

- In 2005, a dedicated journal - ***Advances in Climate Change Research*** was launched in National Climate Center of China.
- CMS directly in charge with 2 academic journals and 1 met magazine.
- CMS local chapters in charge with about 24 journals. *Acta Meteor. Sinica Chinese Edition* ranks No. 1 (IF and total quotations) among all met journals in China.
- CMS is trying to streamline and concentrate all journal resources and develop ***CMS brand met journals*** in China.
- A lot of efforts have been put in organizing and publishing climate change related **articles, book reviews, and reports.**
- ***Special issues*** on monsoon, climate change, and extreme weather have been published.
- Meteorological journals *edited by IAP, CAS*

Part 2: Education and Outreach

Climate Change Education & Outreach

-----CMS Activities

***School camps, university student volunteers,
residential community happy hours,***

Children Arts Competition about Weather and Climate: *start from children, final a meteorologist*



Thirsty!



Wish our dreams come true!



I watch weather forecast everyday!



Weather station launch ceremony



A primary school Weather station

Climate Change Facts and Solutions -

--- TV Competition Program



Participants: middle school students



Toast master in climate change education



University Student Volunteers in Climate Change Education

26th CMS Met Summer Camp

Theme: Desert and Climate Change



Camp Opening



Camp Closing

Climate Change Education & Outreach

-----CMS Activities

**Met Museums in Cities, Met Edu heartland, Met
Theme Park, Met Community Library in rural areas**



China Met Sci & Tech. Exhibition Hall – Designed and set up by CMS



Xiamen Met Theme Park Expert Meeting



CMS Met Edu Heartland Survey, Henan and Shandong provinces



about 70 Met Edu Heartlands in China

Climate Change Education in Rural Areas



Books distributed to farmers!



Handouts in a village



Experts talk to farmers

Climate Change Education & Outreach

-----CMS Activities

World Meteorological Day

China Science Education Day

China Science & Technology Week

“3-23” World Met Day Celebration

**Participants
estimated to be
more than 6000**



2005 WMD Theme:

**“Weather、Climate、Water and Sustainable
Development”**

On WMD Exhibition Board:

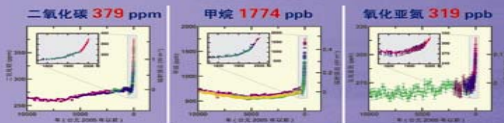


Polar Meteorology

On WMD Exhibition Board:

全球气候变化的最新科学事实和研究进展

近万年来全球大气温室气体浓度变化 (到2005年)

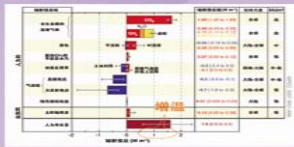


2005年二氧化碳浓度远超过近65万年以来的自然变化 (180至330 ppm)，其在近十年的增长速率为每年 1.9 ppm，远高于近50年有连续直接观测以来的平均每年 1.4 ppm。

2005年甲烷浓度远超过近65万年以来的自然变化 (320至790 ppb)，自20世纪90年代以来，其增长速率已下降。

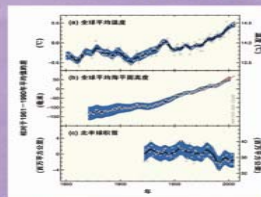
2005年氧化亚氮浓度为 319 ppb，远高于工业化前的约 270 ppb，其增长速率自1980年以来已大致稳定。

自TAR以来，在人类活动对气候增暖 and 冷却作用方面的理解加深，结论的可信度提高。



自1750年以来，人类活动的全球平均净影响是增暖，其辐射强迫为+1.6 [+0.6至+2.4] 瓦/平方米。比太阳辐射强迫+0.12[+0.06至+0.30] 瓦/平方米高一个量级。

气候系统的变暖是不容置疑的

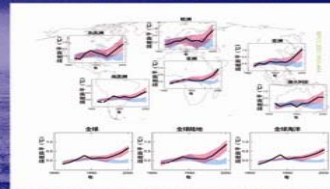


20世纪全球海平面上升约 1.1 米，1993-2005年期间上升速率约 3.1 毫米/年，1993-2005年期间上升速率约 3.1 毫米/年，而TAR中由于自然变率的限制，仅能解释出 20世纪全球平均海平面上升约 0.3 米左右。

全球大部分地区的积雪减少，特别是北半球中高纬度地区 (1965-2005年期间减少约 15%)。

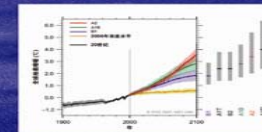
人类活动对气候变化产生影响 这一结论的可信度提高

全球和大陆温度变化

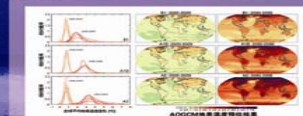


人类活动“很可能”是导致气候变暖的主要原因。“很可能”表示至少90%以上的可能性，而TAR中使用的措辞是“可能”，仅表示至少66%的可能性。

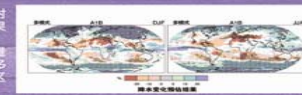
气候变化模拟的进展，使目前能够给出针对不同排放情景下，增暖预估结果的最佳估算值及其不确定性范围。



在多个温室气体排放情景下，本世纪末全球平均升温幅度大致为1.1到6.4度。对于低排放情景 (B1)，升温为1.1至2.9°C，对于高排放情景 (A1FI)，升温为2.4至6.4°C。



自TAR以来，对降水分布预估结果的认识不断提高。高纬度地区的降水量很可能增多，而多数副热带大陆地区的降水量可能减少。



目前对变暖型和其他区域尺度特征的预估结果更为可信。陆地上和大多数北半球高纬度地区的增暖最为显著，而南大洋和北大西洋的变暖最弱。

Latest facts and research results in global climate change

Climate Change Education & Outreach

-----CMS Activities

Interaction between climatologists and general public through live interview on websites and mobile phones



Live web interview on climate change



Let public act as forecasters



Met Quiz through mobile phone SMS



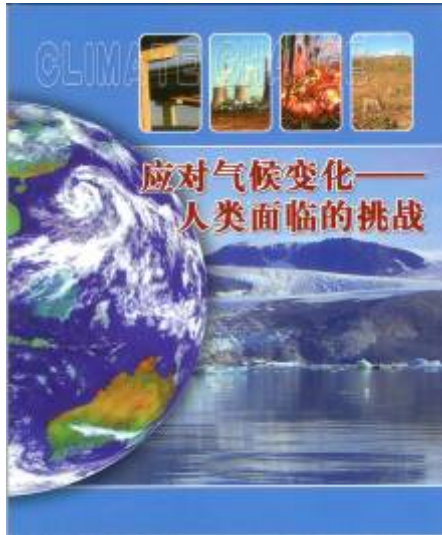
In collaboration with China Mobile Inc.

Climate Change Education & Outreach

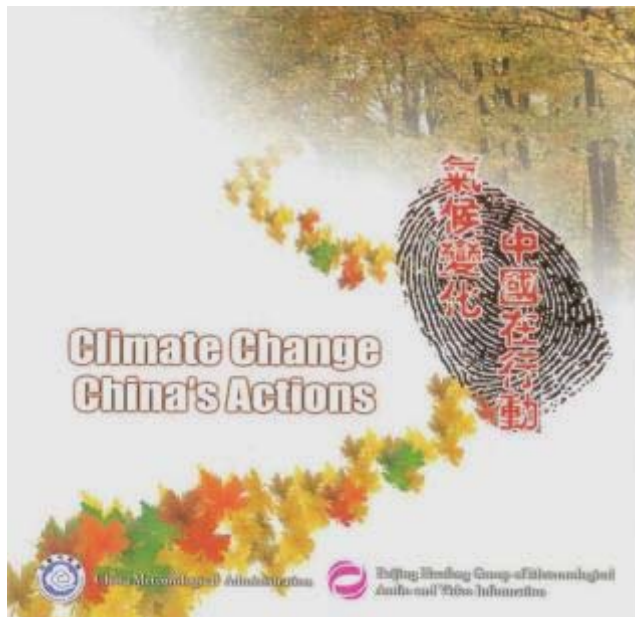
-----CMS Activities

**Dedicated exhibitions, diverse color handouts,
videos, books and magazines**

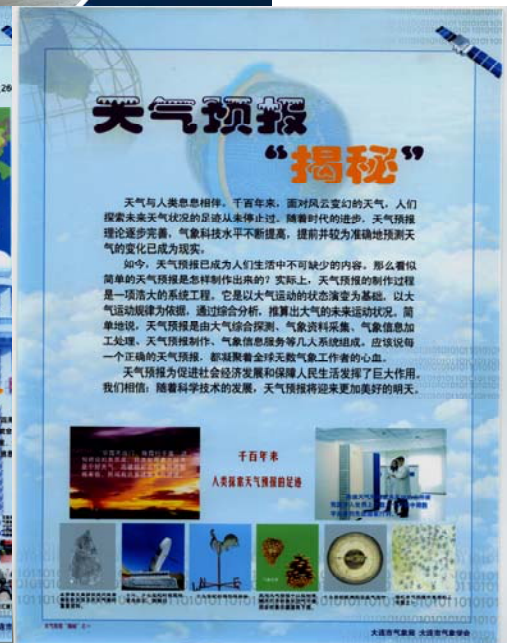
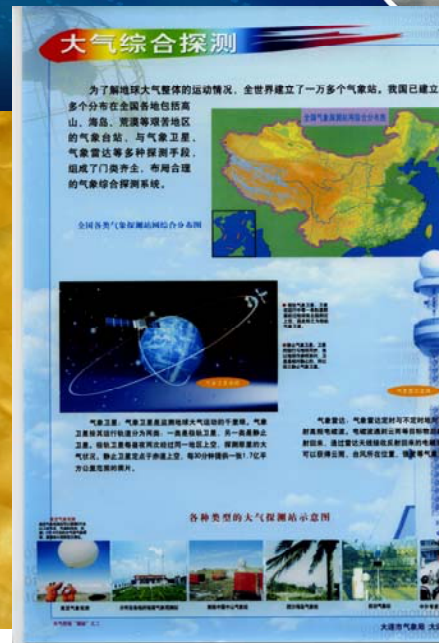
Climate Change Edu Books



- **Simplified IPCC readings**
- **Climate and Environment Chang of China (simplified version)**
- **Booklets on Climate Change**
- **Atlas on Disastrous Weather and Climate**
- **Video clips on Climate Change Illustration**
- **Documentary: Climate Change – China's Actions**
- **Book:40 Q & A about Climate Change**



TV programs, Brochures, CD-Roms



寒潮

雾

生活
土壤



雾
分为浓
米之间
海出现
事故，



出现大雾。



机场大雾！

台风

奇异

如果
的东西，
西被称为
当“
时内还会
四周的大



台风剖面图

沙尘暴

冰雹

天气预报

天气预报制作



把握天气的脉博

阴晴冷暖、雨雪风霜，天气现象
极为复杂多变，要想准确地预报天气
必须使用科学的方法。



气象观测



气候系统

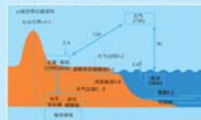
气候系统模型

气候系统中的碳循环(二)

气候系统中的碳循环(一)

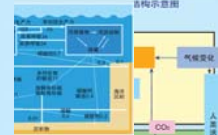
天气预报是一项浩大的工程，
简单地说，它
观测、资料加工
服务几大部分

碳循环是维持地球表层生命活动的主要物质循环。碳循环是指碳在大气、海洋（包括海洋生物群落）、土壤和陆地生物群落之间的输送过程。碳循环中最主要的部分是CO₂循环。
自然界的碳循环过程是异常复杂的。简而言之，大气中的碳不断地进出，一部分与土壤和陆地生物群落交换，另一部分则通过物理和化学过程穿过海洋表面；土壤和陆地生物群落中的碳，除与大气交换外，一些通过溶解随河水流入海洋，一些储存在岩石圈。



运动和变化的一
的事实、原因
、热力学等）、
此，组成气候
和生物圈）都要

每底形成沉积
目中的碳带到
可里大致稳定
造地及海底发
中的CO₂浓度
分布，使北



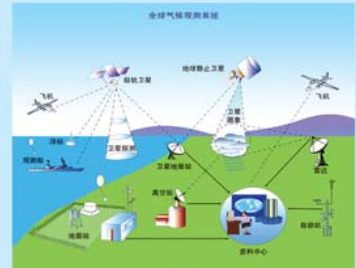
气候系统的能量平衡

气候系统的水循环

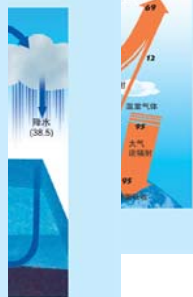
全球气候观测系统

基本特
1-1 气

对气候及其变化进行研究和预测，需要提供气候系统各圈层（大气圈、水圈、岩石圈、冰雪圈、生物圈）的观测资料及加工产品。为此，世界气象组织、联合国教科文组织、联合国环境规划署、国际科学联盟理事会于1992年联合发起了“全球气候观测系统计划”。其基本思路是：在统一的发展计划和技术规范的支持下，对世界上现有的地球环境方面的观测系统进行必要的改进、补充和整合，组成“全球气候观测系统”，以提供高质量、连续、均一的关于气候系统各圈层的观测资料。



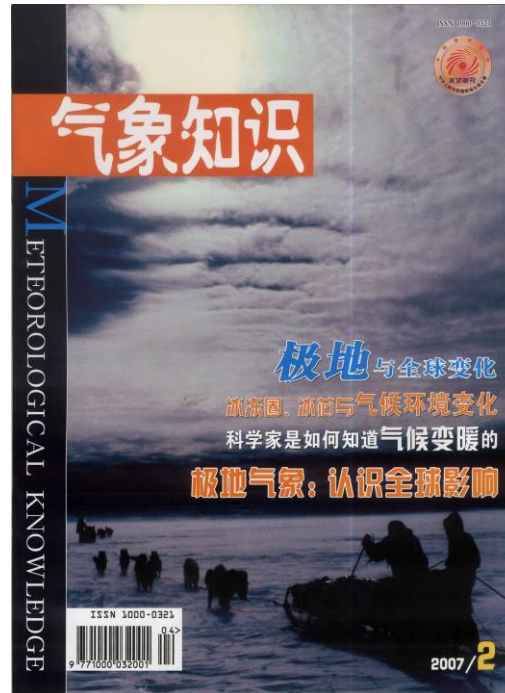
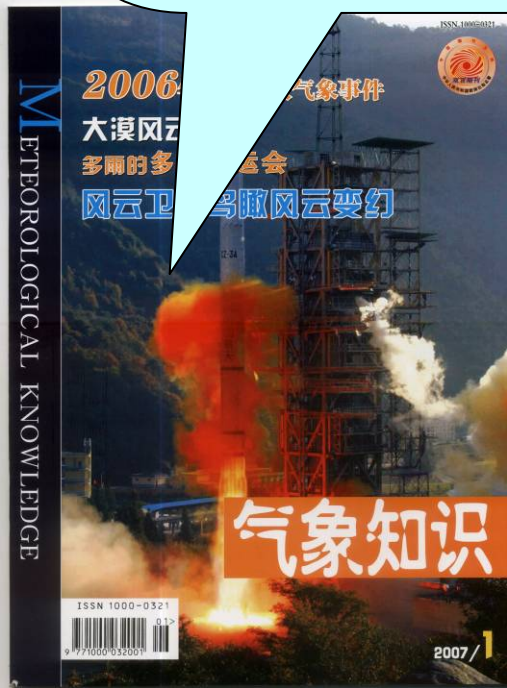
气候系统的
断地向地球
、气溶胶和
、海洋和陆
向地球外层
能与发射出
表面的温度
[化，总的辐
1，因“温室



Board: 400
Picture: 2300
VCD: 500
Book &
Magazine: 10,000

CMS Magazine: "Weatherwise":

**2006 Ten Met Events
A Fengyun Satellite
View of Weather**



**Polar and Global
Climate Change**

**Thunders in
China
Global Climate
Change: Facts,
Influence, and
Response**

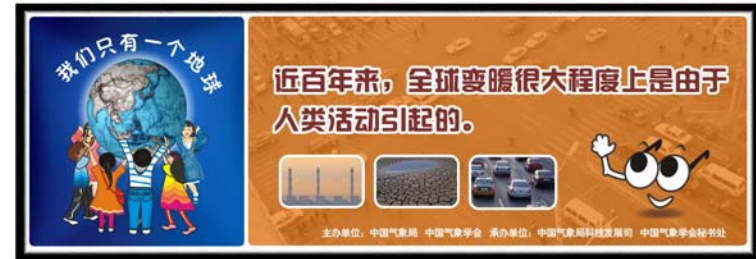


Climate Change Education & Outreach

-----CMS Activities

Climate change education in buses and trains

Climate Change Knowledge in buses



Climate Change Education at Railway Station



In collaboration with China Railway Science Association and Department of Railway Transportation

Climate Change Education & Outreach

-----CMS Activities

**Training courses for met education and outreach
personnel**

climate change education and outreach forum

seminars and town hall meetings on climate change

Climate Change Education Lecture



Let policy makers
know about climate
change



Met Education Training Course



Participants: Met Education Personnel

Achievements of Education and Outreach in Climate Change

- **More attention from policy makers and the governments;**
- *More understanding from general public, especially from farmers (70% of the total population);*
- **Enhanced public awareness on climate change;**
- *Improved public awareness on environment protection, energy conservation, and low carbon life style.*
-

Part 3: Future Plan

CMS Future Plan in Climate Change

- Organize and undertake **more public awareness and educational activities** through more diverse means
- Further enhance the **dynamic exchange and communication** among researchers, policy makers and general public
- **Best effect for** the CMS's leading role in climate change research, education and outreach.
- **International collaborate** with other governmental bodies, NGOs, to promote a better understanding of climate change, adaptation actions and policies.

Annex: Active Players in China's National Climate Change Program

- Ministry of Science and Technology
- National Development and Reform Commission
- Ministry of Foreign Affairs
- Ministry of Education
- Ministry of Finance
- Ministry of Water Resources
- Ministry of Agriculture
- State Environmental Protection Administration
- State Forestry Administration
- Chinese Academy of Sciences
- China Meteorology Administration
- National Natural Science Foundation
- State Oceanic Administration
- China Association for Science and Technology



Thank you for your attention!
